

## Minimizing medication errors: Moving attention from individual to system

The erroneous intravenous infusion of a large dose of magnesium sulfate during labor published in this issue as a case report,<sup>[1]</sup> is certainly another awakening call for introspection. Most of us have witnessed such errors, which may or may not have resulted in mishaps. In spite of being aware of the problem and the probable solutions, these continue to occur possibly due to poor implementation of the solutions. It is the unsafe environment which increases potential for errors and the solution lies in creating safe practice norms.

The history of iatrogenic errors is at least a century old with the first report published in 1910 and it has been getting renewed attention whenever new data or major mishap has surfaced.<sup>[2,3]</sup> In 2000, British Medical Journal devoted an issue to medical errors.<sup>[4]</sup> Medical errors, and infections contribute to more than 99,000 deaths annually, in US alone as per the institute of medicine's landmark report, "to err is human," published a decade back.<sup>[5]</sup> In a recent update, death toll is reported to be approximately 155,000 deaths/year.<sup>[6]</sup> Introspection and critical incident reporting becomes pertinent to discern the true incidence and to perform root cause analysis.<sup>[7]</sup>

Healthcare professionals in the west have addressed the problem with continuous education and working through human engineering and ergonomics. Recent advances in anesthesia and intensive care dedicated chapters on safety solutions.<sup>[8,9]</sup> Some solutions implemented in aviation like the introduction of check-lists etc., have been applied in healthcare with success. Learning from either aviation or industry focuses on one common aspect that is human mind and preoccupation with possibility of failure. Authors of the Thai anesthesia incident monitoring study (AIMS),<sup>[10]</sup> and those of a published review of critical incidents related to drug errors,<sup>[11]</sup> accounted human errors for majority of the drug related incidents and defined human error as situations where established practice was not followed. In these studies, half of incidents were considered as a rule-based mistake. Haste (42.7%), lack of

experience (22%) and miscommunication (15.9%) were the common causes of human error. Vigilance (72%) a state of clinical awareness in which risky conditions are anticipated or diagnosed and treated promptly, were considered as the most common factor in minimizing drug incidents.<sup>[10]</sup>

The three most common factors minimizing the adverse incidents included prior experience, high awareness and experienced assistance. The recommended corrective strategies were guideline practice, quality assurance activity, improvement of supervision, improvement of communication and regular training particularly for the constant change-over of trainee. Hence we need to improve patient safety by addressing the system concerns under which individuals work and also to institute rescue systems to avert errors and mitigate their effects.

The report in question,<sup>[1]</sup> of an inadvertent accidental infusion of a high dose of magnesium in a laboring parturient highlights the likelihood of its occurrence in a busy labor room. Medication errors are common in emergency operation theatre and critical care areas because of the high dynamic activity. Drug related incidents form 7-32% of reported errors.<sup>[11,12]</sup> Among 1996 incident reports of the Thai AIMS database, there were 82 incidents of drug errors (4.1%). Most of drug errors occurred in maintenance phase (57.3%), general anesthesia (87.8%), and in the operation theatre (91.5%).<sup>[10]</sup> There are number of cases where wrong drug administration has resulted in cardiac and respiratory arrests. Problems have also occurred with both types of drug delivery systems; volumetric as well as syringe pumps. High concentration of vasoactive drugs, muscle relaxants and sedatives through syringe pumps may get flushed inadvertently if care is not taken. One should use dedicated infusion lines and must aspirate while stopping or changing drugs through syringe pumps. There is a need to understand that investment in safety measures is cost-effective when compared with the cost of loss of human life and the legal claims resulting from the medical errors.<sup>[13]</sup>

Addressing system issues is easy and effective. System errors occur as an instruction that is either not recognized by an operating system or is in violation of the procedural rules. Incorporating tools like critical incident reporting, checklists, plan-do-check-act cycles and simulation, can lead to continual improvement in our systems.<sup>[10,14]</sup> Long working hours without breaks, multitasking, uncongenial environment, sleeplessness, understaffing and overwork are important causes of skipping

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or violation of procedural steps. Also unbalanced incentives can cause poor performance resulting in working beyond one's capacity which lowers rather than improving efficiency. Attitude of safety can be cultivated by organizational belief in safety. Stress also plays a significant role in causing inattention, thereby making the whole process unsafe.

Staffing, duty shifts, administrative environment to improve efficiency in terms of quantitative and economic values can upset the balance.<sup>[14,15]</sup> Administrators and quality control personnel need to look into these things. It has been found that two shift system as compared to three shifts, week shifts rather than daily shift can reduce the handover errors and diurnal stress.<sup>[14-16]</sup> It is indeed essential that uniform guidelines on optimal working hours for practicing anesthesiologists akin to minimum monitoring standards be formulated. These recommendations which need to be reinforced on an urgent priority in our country have been well exemplified in an editorial, "Maximum working hours and minimum monitoring standards-need for both to be mandatory".<sup>[17]</sup>

Statistics have revealed the potential for medication errors at three different stages; prescription, dispensing and administration. However, it is not only the medication errors which needs attention but other errors too, like missed or wrong diagnosis, wrong prescription, wrong-site injection or wrong patient. Misinformation or misinterpretation of data from malfunctioning monitors and ventilators do result in adverse outcome in patients with poor reserves in critical areas. Recently Hu *et al.* studied deviations in operating room (OR) protocols and found that unanticipated events are common in the OR. Deviations from protocols result from poor organizational design and suboptimal team dynamics, with caregivers compensating to avoid patient harm.<sup>[18]</sup>

To conclude, there is need to shift attention from individual to system. The key to effective, efficient and safe management in any hazardous enterprise is to target the most remediable problems. Creating a culture of safety requires attention not only to the design of our tasks and processes, but to the conditions under which we work, schedules and workloads; how we interact with one another; and perhaps more importantly, how we train every member of the healthcare team to participate in safer and effective patient care. There is need for all stake holders, the government and other health care agencies, hospital administrators, doctors, biomedical engineers and other paramedical teammates to work for a common goal of patient safety.

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